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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,355	03/07/2005	Nobuhiro Nunoya	14321.67	4938

22913 7590 07/22/2009
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EXAMINER	
STAFFORD, PATRICK	

ART UNIT	PAPER NUMBER
2828	

MAIL DATE	DELIVERY MODE
07/22/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/527,355	NUNOYA ET AL.
	Examiner	Art Unit
	PATRICK STAFFORD	2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,14-16 and 50-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,14-16 and 50-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/15/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 15 June 2009 has been entered.

Response to Arguments

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1-7, 9-10, 14-16, 50-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Numai (U.S. Patent 6,501,776, hereafter ‘776) in view of Funabashi (U.S. Patent 6,580,740, hereafter ‘740) and further in view of Lo (U.S. Patent 5,617,436, hereafter ‘436).

Claim 1: ‘776 teaches a semiconductor laser comprising:

a gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having an effective refractive index whose temperature dependence differs from that of the gain region and having no wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a reflecting region that reflects light propagated through the propagating region, and has no gain (col. 4, lines 17-28, the distributed Bragg reflector);

and the gain region and said reflection region form a cavity for laser oscillation with an extended stop bandwidth (col. 12, lines 13-15).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index and the reflecting region having high reflectivity. However, Funabashi '740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41) and the reflecting region has high reflectivity (col. 7, lines 43-44) in order to reflect the light and lase the desired wavelength (col. 7, lines 46-51). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a

complex refractive index and the reflecting region has high reflectivity in order to reflect the light and lase the desired wavelength.

‘776 and ‘740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. ‘436 teaches a semiconductor laser with a gain region comprising a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} (col. 3, lines 50-56) as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 2: ‘776 teaches a semiconductor laser comprising:

a gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having a material with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a reflecting region that reflects light propagated through the propagating region, and has no gain (col. 4, lines 17-28, the distributed Bragg reflector);

and the gain region and said reflection region form a cavity for laser oscillation with an extended stop bandwidth (col. 12, lines 13-15).

‘776 does not explicitly teach the propagation region is a material other than a semiconductor. However, it would have been an obvious matter of design choice to use a material other than a semiconductor, since applicant has not disclosed that using a material other than a semiconductor material for a propagating region solves any stated problem or is any particular purpose and it appears that the invention would perform equally well with any material with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity.

‘776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index and the reflecting region having high reflectivity. However, Funabashi ‘740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41) and the reflecting region has high reflectivity (col. 7, lines 43-44) in order to reflect the light and lase the desired wavelength (col. 7, lines 46-51). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a

complex refractive index and the reflecting region has high reflectivity in order to reflect the light and lase the desired wavelength.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. '436 teaches a semiconductor laser with a gain region comprising a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} (col. 3, lines 50-56) as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 3: '776 teaches a semiconductor laser comprising:

a gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having a structure with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a reflecting region that reflects light propagated through the propagating region, and has no gain (col. 4, lines 17-28, the distributed Bragg reflector) ;

and the gain region and said reflection region form a cavity for laser oscillation with an extended stop bandwidth (col. 12, lines 13-15).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index and the reflecting region having high reflectivity. However, Funabashi '740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41) and the reflecting region has high reflectivity (col. 7, lines 43-44) in order to reflect the light and lase the desired wavelength (col. 7, lines 46-51). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index and the reflecting region has high reflectivity in order to reflect the light and lase the desired wavelength.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. '436 teaches a semiconductor laser with a gain region comprising a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} (col. 3, lines 50-56) as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a

whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 4: ‘776, ‘740 and ‘436 teach the semiconductor laser as claimed in claim 1. ‘776 teaches the reflection region has a diffraction grating with a periodic structure (col. 4, lines 17-28, the distributed Bragg reflector). Distributed Bragg reflectors inherently have periodic structures (Furuya U.S. Patent 4,464,762, col. 1, lines 17-23).

Claim 5: ‘776 teaches a semiconductor laser comprising:

a first gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having a material with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a second gain region optically coupled to the propagating region, and having wavelength selectively (col. 6, lines 51-58 and col. 19, lines 20-29 and Fig. 12, parts 723);

and the gain regions form a cavity for laser oscillation with an extended stop bandwidth (col. 12, lines 13-15).

‘776 does not explicitly teach the propagation region is a material other than a semiconductor. However, it would have been an obvious matter of design choice to use a material other than a semiconductor, since applicant has not disclosed that using a material other

than a semiconductor material for a propagating region solves any stated problem or is any particular purpose and it appears that the invention would perform equally well with any material with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity.

'776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index. Funabashi '740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. '436 teaches a semiconductor laser with a gain region comprising a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} (col. 3, lines 50-56) as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was

made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 6: ‘776 teaches a semiconductor laser comprising:

a first gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having a structure with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a second gain region optically coupled to the propagating region, and having wavelength selectively (col. 6, lines 51-58 and col. 19, lines 20-29 and Fig. 12, parts 723);

and the gain regions form a cavity for laser oscillation with an extended stop bandwidth (col. 12, lines 13-15).

‘776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index. Funabashi ‘740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to use the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index.

‘776 and ‘740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. ‘436 teaches a semiconductor laser with a gain region comprising a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} (col. 3, lines 50-56) as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 7: ‘776, ‘740 and ‘436 teach the semiconductor laser of claim 3. ‘776 teaches the structure of the propagating region differs from a structure of the gain region in at least one of a layer structure (col. 20, lines 19-24).

Claim 9: ‘776, ‘740 and ‘436 teach the semiconductor laser of claim 1. ‘776 teaches the propagating region is composed of a material whose temperature differential coefficient of the effective refractive index (col. 20, lines 57-63) is different from that of a semiconductor (col. 9, lines 11-18). ‘776 does not explicitly teach the propagation region is a material other than a semiconductor. However, it would have been an obvious matter of design choice to use a material other than a semiconductor, since applicant has not disclosed that using a material other

than a semiconductor material for a propagating region solves any stated problem or is any particular purpose and it appears that the invention would perform equally well with any material with a temperature differential coefficient of the effective refractive index is different from a semiconductor.

Claim 10: ‘776, ‘740 and ‘436 teach the semiconductor laser of claim 1. ‘776 teaches the propagating region is composed of a material whose temperature differential coefficient of the effective refractive index is negative (col. 3, lines 39-46). ‘776 does not explicitly teach the propagation region is a material other than a semiconductor. However, it would have been an obvious matter of design choice to use a material other than a semiconductor, since applicant has not disclosed that using a material other than a semiconductor material for a propagating region solves any stated problem or is any particular purpose and it appears that the invention would perform equally well with any material whose temperature differential coefficient of the effective refractive index is negative.

Claim 14: ‘776, ‘740 and ‘436 teach the semiconductor laser of claim 1. ‘776 teaches the gain region (Fig. 15A, part 1023), the propagating region (Fig. 15A, part 1024), and the reflection region (Fig. 15A, part 1025) are stacked (col. 21, line 66-col. 22, line 15).

Claim 15: ‘776, ‘740 and ‘436 teach the semiconductor laser of claim 1. ‘776 teaches the gain region and the propagating region are coupled via optical path changing means (col. 7, lines 37-41).

Claim 16: ‘776, ‘740 and ‘436 teach the semiconductor laser of claim 1. ‘776 teaches the propagating region (Fig. 14A part 924) has a waveguide structure having an optical confinement

structure on the upper (Fig. 14A part 921, the cladding layer) and lower portions (col. 21, lines 37-39).

Claims 50-54: Rejected for the same reason as claims 1-6 above.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Numai ‘776 in view of Funabashi ‘740 and Lo (U.S. Patent 5,617,436, hereafter ‘436) and further in view of Kirkby (U.S. Patent 4,583,227, hereafter ‘227).

‘776, ’740 and ‘436 teach the semiconductor laser of claim 1, as discussed above. They do not teach the absolute value of a product of a length of the propagating region and a difference between a temperature differential coefficient of the effective refractive index of the gain region and a temperature differential coefficient of the effective refractive index of the propagating region is equal to or greater than 7.5×10^{-4} µm/K. Kirkby ‘227 teaches the absolute value of a product of a length of the propagating region and a difference between a temperature differential coefficient of the effective refractive index of the gain region and a temperature differential coefficient of the effective refractive index of the propagating region is equal to or greater than 7.5×10^{-4} µm/K is a suitable value for temperature compensating semiconductor lasers (col. 7, lines 4-8). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the absolute value of a product of a length of the propagating region and a difference between a temperature differential coefficient of the effective refractive index of the gain region and a temperature

differential coefficient of the effective refractive index of the propagating region is equal to or greater than 7.5×10^{-4} μm/K.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Numai ‘776 in view of Funabashi ‘740 and Lo (U.S. Patent 5,617,436, hereafter ‘436) and further in view of Kashyap (U.S. Patent 5,719,974, hereafter ‘794).

‘776, ’740 and ‘436 teach the semiconductor laser of claim 1, as discussed above. They do not explicitly teach the length of the propagating region is determined such that a longitudinal mode spacing determined by a sum of an effective length of the diffraction grating and a length of the propagating region, is greater than a stop bandwidth of the diffraction grating. ‘794 teaches the length of the propagating region is determined such that a longitudinal mode spacing determined by a sum of an effective length of the diffraction grating and a length of the propagating region, is greater than a stop bandwidth of the diffraction grating (col. 8, line 24 and col. 9, lines 2-5) as suitable values for the diffraction grating in a semiconductor laser. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the length of the propagating region such that a longitudinal mode spacing determined by a sum of an effective length of the diffraction grating and a length of the propagating region, is greater than a stop bandwidth of the diffraction grating.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PATRICK STAFFORD whose telephone number is (571)270-1275. The examiner can normally be reached on M-Th 7:30-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. S./
Examiner, Art Unit 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828